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APPLICATION FOR UNITED STATES LETTERS PATENT

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TITLE:	HAND CONTROLLED REGULATOR FOR A RESISTANCE-PROVIDING DEVICE OF AN EXERCISER
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**TITLE: HAND CONTROLLED REGULATOR FOR A RESISTANCE-
PROVIDING DEVICE OF AN EXERCISER**

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a hand controlled regulator, more particularly to a hand controlled regulator for a resistance-providing device of an exerciser.

2. Description of the Related Art

10 A conventional hand controlled regulator 10 is connected to a resistance-providing device 3 of an exerciser 1 through a string 5, as best shown in Figure 1.

15 Referring to Figure 2, the conventional hand controlled regulator 10 includes a casing 11, a rotatable member 13, a string-mounting member 15, a post unit 14, a positioning disc 16, and an operating knob 12. The post unit 14 is mounted securely in the casing 11. The string-mounting member 15 is sleeved
20 around the post unit 14, and is formed with an annular groove 151. The rotatable member 13 is sleeved rotatably on the post unit 14, has an annular lower part 131 disposed above and connected securely to the string-mounting member 15 for co-rotation therewith.
25 The string 5 is wrapped around and is disposed in the annular groove 151 in the string-mounting member 15, and has a first end secured to the string-mounting

member 15. An upper face of the casing 11 is formed with a spring-mounting seat 11" that has opposite curved slots 110 which respectively receive left and right spring-loaded engaging balls 111,112 therein.

5 The operating knob 12 is mounted rotatably on the casing 11 around the spring-mounting seat 11". The positioning disc 16 is sandwiched between the operating knob 12 and the spring-mounting seat 11", is formed with a series of left ball-retaining grooves
10 161 and a series of right ball-retaining grooves 161, and is co-rotatable with the operating knob 12. The positioning disc 16 has a central rectangular opening and is sleeved securely on the rotatable member 13 for co-rotation therewith. The left and right spring-
15 loaded engaging balls 111,112 are urged upward so as to extend into a corresponding pair of the ball-retaining grooves 161 in the positioning disc 16, thereby positioning the operating knob 12 in a stationary state. The second end of the string 5 is
20 connected to the resistance-providing device 3 of the exerciser 1 under tension.

The conventional hand controlled regulator 10 is disadvantageous in that rotation of the operating knob 12 to increase the resistance of the resistance-
25 providing device 3 is laborious. Moreover, undesired disengagement of the spring-loaded engaging balls 111,112 from the corresponding ones of the ball-

retaining grooves 161 may occur due to a counteract pulling force applied thereto, which results from the tension of the string 5.

SUMMARY OF THE INVENTION

5 Therefore, the object of this invention is to provide a hand controlled regulator for a resistance-providing device of an exerciser so as to overcome the aforesaid disadvantages of the conventional hand controlled regulator.

10 According to the present invention, a hand controlled regulator is adapted to be connected to a resistance-providing device through a string. The hand controlled regulator includes: a casing; an elongated rotatable member that is mounted rotatably
15 on the casing, that defines a rotation axis, and that is operable to rotate about the rotation axis; and a sliding carriage that is mounted movably on the casing, that is adapted to be connected to a connecting end of the string, and that engages the rotatable member
20 in such a manner that rotation of the rotatable member results in a linear movement of the sliding carriage in an axial direction that is parallel to the rotation axis, which, in turn, results in a linear movement of the connecting end of the string in the axial
25 direction.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of this invention

will become more apparent in the following detailed description of the preferred embodiments of this invention, with reference to the accompanying drawings, in which:

5 Figure 1 is a perspective view of an exerciser equipped with a conventional hand controlled regulator;

 Figure 2 is an exploded perspective view of the conventional hand controlled regulator;

10 Figure 3 is an exploded perspective view of the first preferred embodiment of a hand controlled regulator according to the present invention;

 Figure 4 is a perspective view of an exerciser which is provided with the hand controlled regulator of the
15 present invention;

 Figure 5 is a sectional top planar view of the first preferred embodiment;

 Figure 6 is a fragmentary sectional side view of the first preferred embodiment;

20 Figure 7 is a fragmentary sectional side view of the first preferred embodiment, illustrating how rotation of a rotatable member results in a linear movement of a sliding carriage relative to the rotatable member;

25 Figure 8 is an exploded perspective view of the second preferred embodiment of a hand controlled regulator according to the present invention;

Figure 9 is an exploded perspective view of the third preferred embodiment of a hand controlled regulator according to the present invention;

5 Figure 10 is a partly fragmentary exploded perspective view of the fourth preferred embodiment of a hand controlled regulator according to the present invention;

10 Figure 11 is a partly fragmentary exploded perspective view of the fifth preferred embodiment of a hand controlled regulator according to the present invention;

Figure 12 is an exploded perspective view of the sixth preferred embodiment of a hand controlled regulator according to the present invention; and

15 Figure 13 is a sectional top planar view of the sixth preferred embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 Before the present invention is described in greater detail with reference to the following preferred embodiments, it should be noted that same reference numerals have been used to denote similar elements throughout the specification.

25 Referring to Figures 3 to 5, the first preferred embodiment of a hand controlled regulator according to the present invention is adapted for use in an exerciser 100 which includes a pedal wheel 2", a resistance-providing device 3", and an upright post

3'.

As illustrated, the resistance-providing device 3", preferably a retarding wheel, is operably connected to the pedal wheel 2" and to the first preferred embodiment through a string 53 so as to provide an exercising effect when the user pedals the pedal wheel 2".

The first preferred embodiment includes a casing 20, an elongated rotatable member 40, and a sliding carriage 50.

The casing 20 is mounted securely on the upright post 3' of the exerciser 100 and is formed of upper and lower casing halves 21, 22 that are coupled together.

The rotatable member 40 is mounted rotatably in the casing 20 through a pair of mounting posts 24 (only one is shown in Figure 3), defines a rotation axis, and is operable to rotate about the rotation axis.

The sliding carriage 50 is mounted movably in the casing 20, is adapted to be connected to a connecting end of the string 53, and engages the rotatable member 40 in such a manner that rotation of the rotatable member 40 results in a linear movement of the sliding carriage 50 in an axial direction that is parallel to the rotation axis, which, in turn, results in a linear movement of the connecting end of the string 53 in the

axial direction. Since the pulling force resulting from the tension of the string 53 and applied to the rotatable member 40 through the sliding carriage 50 is in a direction parallel to the rotation axis, the
5 rotatable member 40 cannot be rotated to cause the sliding carriage 50 to move in the axial direction.

In the first preferred embodiment, the rotatable member 40 is a multiple-thread screw rod 42. The sliding carriage 50 includes a movable carriage part
10 51 and a stationary carriage part 52. The movable carriage part 51 is formed with an inner thread 511 that engages threadedly the screw rod 42. The stationary carriage part 52 is disposed securely on the lower casing half 22 of the casing 20 through a
15 mounting seat 25 (see Figure 3), and is associated with the movable carriage part 51. The stationary carriage part 52 has a contact face 520. The movable carriage part 51 has an abutment face 512 that slidably abuts against the contact face 520 of the stationary
20 carriage part 52 so as to limit co-rotation of the movable carriage part 51 with the screw rod 42. The abutment face 512 of the movable carriage part 51 is formed with a retaining groove 513 which receives the connecting end of the string 53. The other end of the
25 string 53 extends through a hole 26 in the lower casing half 22 (see Figure 6) to connect with the resistance-providing device 3" of the exerciser 100

(see Fig. 4).

The first preferred embodiment further includes a hand operating mechanism 30 that engages the screw rod 42, and that includes a driving member, such as a driving gear 31, and a driven member, such as a driven pinion 41. The driving gear 31 is rotatably mounted in the casing 20 adjacent to the screw rod 42 through a pair of bearings 23 (only one is shown in Figure 3). The driven pinion 41 is mounted securely and coaxially on the screw rod 42, and meshes with the driving gear 31. The driving gear 31 has an upper face formed with an indicating scale (C) (see Figure 5) to indicate a range of adjustment of the resistance-providing device 3" of the exerciser 100 through the string 53. The upper and lower casing halves 21,22 cooperatively define a side opening 28. The driving gear 31 is partially exposed from the casing 20 through the side opening 28 to facilitate turning of the same to rotate the driven pinion 41 (see Figure 7). In this preferred embodiment, the speed ratio of the driven pinion 41 to the driving gear 31 is greater than one such that one revolution of the driving gear 31 results in revolutions of the driven pinion 41 together with the screw rod 42, thereby facilitating advancing of the movable carriage part 51.

Referring to Figure 8, the second preferred embodiment of a hand controlled regulator according

to the present invention is shown to have a construction similar to that of the first preferred embodiment. The main difference resides in that the hand operating mechanism 30' further includes a lever 311' that extends outwardly from the driving gear 31' through the side opening 28' in the casing 20' so as to facilitate turning of the driving gear 31'.

Referring to Figure 9, the third preferred embodiment of a hand controlled regulator according to the present invention is shown to have a construction similar to that of the first preferred embodiment. The main difference resides in that the hand operating mechanism 60 includes a first friction wheel 622 rotatably mounted in the casing 61 adjacent to the screw rod 63, and a second friction wheel 631 mounted securely and coaxially on the screw rod 63 and engaging frictionally the first friction wheel 622, and a turning knob 621 mounted on the casing 61 and coaxially connected to the first friction wheel 622 through a coupler shaft 62. The first friction wheel 622 has a diameter greater than that of the second friction wheel 631 such that one revolution of the first friction wheel 622 results in revolutions of the second friction wheel 631 together with the screw rod 63.

Referring to Figure 10, the fourth preferred embodiment of a hand controlled regulator according

to the present invention is shown to have a construction similar to that of the first preferred embodiment. The main difference resides in that the hand operating mechanism 66 includes a first pulley 622' rotatably mounted in the casing 61' adjacent to the screw rod 63', and a second pulley 631' mounted securely and coaxially on the screw rod 63', a friction belt 625 trained over the first and second pulleys 622', 631', and a turning knob 621' mounted on the casing 61' and connected coaxially to the first pulley 622' through the coupler shaft 62'. The first pulley 622' has a diameter greater than that of the second pulley 631'.

Referring to Figure 11, the fifth preferred embodiment of a hand controlled regulator according to the present invention is shown to have a construction similar to that of the first preferred embodiment. The main difference resides in that the hand operating mechanism 60" includes a first grooved wheel 622" mounted rotatably in the casing 61" adjacent to the screw rod 63", and a second grooved wheel 631" mounted securely and coaxially on the screw rod 63", and a beaded chain 62" trained over the first and second grooved wheels 622", 631". The first grooved wheel 622" has a diameter greater than that of the second grooved wheel 631".

Referring to Figures 12 and 13, the sixth preferred

embodiment of a hand controlled regulator according to the present invention is shown to have a construction similar to that of the first preferred embodiment. The main difference resides in that the hand operating mechanism 70 includes a rack-and-pinion assembly having a pinion 732, a rack member 74, and a rack-holding member 72. The pinion 732 is mounted securely and coaxially on the screw rod 733. The rack-holding member 72 is disposed in the casing 71, is formed with a rack-guiding track 721 extending in a transverse direction relative to the rotation axis, has a side face 725 extending in a direction parallel to the screw rod 733, and a mounting wall 720 that extends transversely from the side face 725. The mounting wall 720 is disposed between the upper casing half and the pinion 732 in such a manner that a top end 731 of the screw rod 733 extends through a mounting hole 722 in the mounting wall 720. The rack member 74, preferably a flexible rack, is disposed slidably in the rack-guiding track 721, and meshes with the pinion 732 through a side opening 723. An operating lever 741 is connected to the rack member 74, and extends outward therefrom through the side opening 711 in the casing 71 to facilitate operation thereof.

With the inclusion of the hand controlled regulator of the present invention, the aforesaid disadvantages of the prior art are accordingly overcome.

With this invention thus explained, it is apparent that numerous modifications and variations can be made without departing from the scope and spirit of this invention. It is therefore intended that the invention
5 be limited only as indicated in the appended claims.